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Behavioural Addiction: a Useful Construct?

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Abstract The concept of 'addiction' has long been used with reference to substance use disorders. There has, however, been growing interest in applying the term to other conditions, i.e. behavioural addictions, which are characterized by preoccupation with and decreased control over a range of behaviours other than substance intake that are rewarding but have adverse consequences. The best studied behavioural addiction, gambling disorder, is now included in DSM-5 under the rubric of substance-related and addictive disorders. In contrast, an ICD-11 proposal argues that pathological gambling continues to be classified as an impulse control disorder. Other putative behavioural addictions, such as compulsive sexual behaviour and internet gaming addiction, are equally controversial. Here, we review some of the relevant debates. We argue that while the construct of behavioural addiction may be useful in clinical practice and in research contexts, further work is needed to assess the extent of its diagnostic validity and clinical utility.

Keywords Behavioural addiction · Chemical addiction · Epidemiology · Phenomenology · Treatment · Psychobiology

This article is part of the Topical Collection on *Addictions*

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Introduction

The concept of 'addiction' has long been used with reference to substance use disorders [1]. There has recently been growing interest in applying the term to other conditions, that is behavioural addictions—characterized by preoccupation with and diminished control over rewarding behaviours with adverse consequences, other than substance use. A range of arguments have been put forwards in support of the diagnostic validity and clinical utility of the construct of behavioural addiction. In an early editorial, for example, Marks argued that from a cognitive-behavioural perspective, it would be useful to regard a wide range of repetitive leisure activities as belonging to an addictive syndrome [2]. More recently, Robbins and Clark have emphasized that substance use disorders and behavioural addictions share a range of underlying psychobiological mechanisms and so may respond to similar sorts of intervention [3].

The latest edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) has for the first time included a chapter on Substance-Related and Addictive Disorders, with gambling disorder as the sole exemplar of an addictive disorder [4]. In contrast, an ICD-11 proposal has argued that pathological gambling should remain in the chapter on impulse control disorders given its apparent resemblance to other such disorders such as kleptomania and intermittent explosive disorder [5]. The nosological status of the several other putative behavioural addictions remains controversial. Internet gaming disorder, for example, has been included in the Conditions for Further Study section in DSM-5. Proposals that DSM-5 include hypersexual disorder [4] were discarded, but this condition has been proposed for ICD-11 [5].

In this paper, we review some of the relevant debates about the diagnostic validity and clinical utility of the construct of behavioural addiction.

Methods

We conducted a literature search using Medline and Google Scholar, using the terms 'behavioural addiction' and 'behavioral addiction'. Given space limitations and the multiple topics covered in the literature, here we provide a narrative review of key issues relevant to a consideration of diagnostic validity and clinical utility. We divide our 'Results' section into subsections on (1) 'Epidemiology and Phenomenology', (2) 'Psychobiology' and (3) 'Treatment'.

Results

Epidemiology and Phenomenology

In their review of the epidemiology of chemical and behavioural addictions, Gowing and colleagues note that the prevalence of these conditions is among the highest of all mental disorders [6]. That said, prevalence data regarding behavioural addictions (with the exception of gambling) are sparse. In one of the most comprehensive systematic reviews of the epidemiology of substance and behavioural addictions, Sussman et al. [7] focused on the examination of prevalence data of 11 addictive and potentially addictive behaviours in the general US adult population. They reported overall 12-month prevalence rates of addictions to cigarette smoking (15 %), alcohol (10 %), illicit drug taking (5 %), gambling (2 %), internet use (2 %), eating (2 %), love (3 %), sex (3 %), exercise (3 %), work (10 %) and shopping (6 %). There are even fewer data on adolescents. Villella et al. [8] evaluated the prevalence of behavioural addictions in a population of 2853 Italian adolescents. Overall, prevalence was 7 % for pathological gambling, 11 % for compulsive buying, 1 % for internet addiction, 8 % for work addiction and 9 % for exercise addiction. Comorbidity of behavioural addiction was widely reported in both these studies.

It is not altogether clear why different potentially addictive behaviours differ in prevalence. It may be suggested that addictions involving relatively immediate aversive consequences (quick financial loss, social rejection and injury) may have lower prevalence. On the other hand, behaviours that are not restricted by society or are even promoted by producers would have a higher prevalence. This hypothesis appears to fit the data partly, insofar as cigarettes and alcohol—which do not always have immediate aversive consequences and are widely promoted—are highly prevalent. Nevertheless, a range of other factors may also be relevant; for example, nicotine is a highly rewarding substance, so contributing to widespread use, but in countries where legislation has been introduced to curtail smoking (e.g. banning smoking in public spaces), prevalence has fallen.

Central characteristics of the chemical addictions include impaired control (e.g. repeated unsuccessful attempts to reduce intake of a substance), risky use (e.g. persistent intake despite damaging psychological or physiological effects), pharmacological consequences (including craving, need to use increasingly large quantities [tolerance] and withdrawal effects), and functional impairment (e.g. at work, poor or neglected social relationships, narrowing of interests) [1]. The putative behavioural addictions share considerable phenomenological parallels with substance addiction including impaired control, persisting engagement in the behaviour despite negative consequences and functional impairment [9]. At the same time, the absence of direct pharmacological consequences in behavioural addictions means that phenomena such as 'tolerance' and 'withdrawal' may differ in key ways from those described in the chemical addiction literature—even though attempts to cut back on addictive behaviours may be accompanied by a range of sequelae [9, 10, 11•].

Similarly, data on the course of chemical and behavioural addictions suggest both similarities and differences. Both sets of conditions are associated with significant comorbidity and morbidity, and lead over time to a range of impairments [4, 12, 13]. However, while substances often have measurable negative physical effects on the body, the relationships between behavioural addiction and somatic illness are more indirect (for example, gambling disorder may be associated with decreased physical activity, and so increased risk of some illnesses). Furthermore, while data on course of behavioural addiction are spare, these may be more episodic than the chemical addictions, and spontaneous recovery may be more common [14••]. On the other hand, it is remarkable that attempts to reduce symptoms of one behavioural addiction may be followed by increased symptoms of another chemical or behavioural addiction. Indeed, one important argument supporting the diagnostic validity and clinical utility of the construct of behavioural addiction is the finding that there is significant comorbidity of these conditions with substance use disorders [13, 14••].

Psychobiology

The majority of available psychobiological data on chemical and behavioural addictions have emerged from investigations of the neural circuitry and molecular biology of substance use disorders. However, recent years have witnessed a significant increase in studies of the psychobiology of the behavioural addictions, especially gambling disorder [15]. Data on some of the other putative behavioural addictions, such as kleptomania and compulsive sexual behaviour, remain sparse. Reasons for the paucity of research studies on these conditions include the perceived rarity of these conditions, difficulty obtaining funding, difficulties in recruiting large samples, and in some instances, lack of consensus on the definition of

the relevant disorder [9]. There remains significant controversy about whether behavioural addictions should be viewed as disorders, rather than say as a lifestyle choice, perhaps also contributing to the relative lack of work on these conditions.

It has been known for many years that the prefrontal cortex plays an important role in inhibitory control over behaviour [16, 17]. Addictive substances impact on the brain's reward systems, including neural circuitry such as the ventral striatum, and component neurotransmitter systems such as the dopaminergic and opioid systems [18]. In addition to adaptions in the reward system and diminished functioning of cognitive control systems following repeated drug intake [19], changes in the mesolimbic prefrontal dopaminergic pathways have been found that suggest a transition from prefrontal cortical to dorsal striatal control over drug seeking/taking behaviours, as well as a progression from ventral to more dorsal parts of the striatum [18]. These processes have been hypothesized to drive 'compulsive use' or an inability to inhibit the pathological behaviours typical of chemical addiction [19, 20].

Similarly, the frontostriatal cortical circuit appears to play major roles in executive functioning [21] and inhibitory control [22] in individuals with gambling disorder. Data from the first neuro-imaging meta-analysis of functional brain response to cognitive tasks in gambling disorder found clusters of abnormal activation in the right lentiform nucleus and left middle occipital gyrus compared to healthy controls [23]. This is partially consistent with work on alcohol dependence [24]. There are fewer data on other behavioural addictions, but structural imaging studies of pathological internet use have found reduced grey matter density in the inferior frontal gyrus, cingulate, insula, precuneus and the hippocampus, in addition to lower white matter density in related regions [25]. A recent meta-analysis of whole-brain fMRI studies of internet gaming disorder found an association with excess activation in the bilateral medial frontal gyrus, left cingulate gyrus, left medial temporal gyrus and fusiform gyrus [26]. Further work is needed in order to assess the extent of overlap in psychobiology with other behavioural addictions such as compulsive sexual behaviour.

Multiple neurotransmitter systems have been implicated in the pathophysiology of addictions [27]. Specifically, the involvement of the serotonin system, which is involved with inhibition of behaviour, and the dopamine system, which is involved with learning, motivation, and the salience of stimuli, including rewards, has been studied [27]. Other neurotransmitter systems such as the glutamatergic and opioid systems have also been implicated in addictions [27]. Substances directly or indirectly affect dopamine levels in the neural 'reward system'. Diminished dopamine (DA) function is considered to be the hallmark of chemical addictions, with reductions in dopamine (DA) D2/D3 receptors and dopamine transporter availability in the striatum [28••, 29]. A significant body of genetics research emphasizes the heritability of these conditions and has pointed to the role of specific genetic variations in monoaminergic and other neurotransmitter systems in mediating vulnerability [30•].

In four independent studies, individuals with problem gambling had no differences in dopamine D2/D3 receptor binding [31–34]. Some of these studies did observe that reduced dopamine receptor levels were correlated with mood-related impulsivity and gambling severity, and a more recent study by Boileau [35] showed increases in striatal dopamine release in problem gamblers as well as positive correlations between dopamine release and gambling severity. In other behavioural addictions, the dopaminergic system may also play a key role in mediating symptoms. For example, dopamine agonists may lead to increased sexual behaviour in patients with Parkinson's disease [36, 37]. However, as discussed in more detail below, pharmacotherapy data do not straightforwardly support the notion of an overlap between chemical and behavioural addictions.

Research on the genetic underpinnings of gambling disorder has increased in recent years [38, 39]. Current available evidence suggests substantial heritability for gambling disorders, with some evidence supporting shared heritable contributions across gambling disorder and substance dependence [40]. It is however premature to make similar claims for other behavioural addictions.

Treatment

Individuals with behavioural addiction do not always seek professional help [14••]. Higher rates of treatment seeking are perhaps seen with excessive exercising and eating [14••]. Most people who seek help for these kinds of excessive behaviours tend to turn to health care professionals and not to lay helpers or social support in general [14••]. This may indicate that individuals perceive such excessive behaviours as a medical problem and not as a lifestyle, spiritual or other issue [14••]. Indeed, there has been a gradual growth in the literature on the psychotherapy and pharmacotherapy of behavioural addictions, which we consider next, addressing some of the similarities and differences with the literature on chemical addictions.

Psychological Treatment

Most of the available evidence supports cognitive-behavioural interventions as first-line treatment for both substance use disorders and gambling disorder [41, 42]. These interventions have also been successfully used to treat behavioural addictions such as compulsive sexual behaviour, kleptomania and compulsive shopping [43–45]. Systematic reviews and meta-analyses have provided evidence for the efficacy of

motivational interviewing in the treatment of substance use disorders [46, 47]. Yakovenko et al. conducted a systematic review and meta-analysis on the efficacy of motivational interviewing, compared to non-motivational interviewing controls, in the treatment of gambling disorder [48]. Motivational interviewing was associated with significant reduction in gambling frequency up to a year after treatment delivery. For gambling expenditure, motivational interviewing yielded significant reductions in money spent on gambling compared to non-motivational controls at post-treatment only (1–3 months). Thus, motivational interviewing may be an efficacious therapy for gambling disorder in the short-term, although there are few maintenance data.

Mindfulness-based psychotherapy has been found efficacious in the treatment of a wide range of diverse conditions, including substance use disorders [49]. De Lise et al. reviewed the literature to consider the potential of mindfulness-based psychotherapy for problem gambling and the mechanisms by which mindfulness may be therapeutically beneficial [50]. Despite tentative evidence that mindfulness may improve problem gambling outcomes and psychological distress, it is insufficient to establish the efficacy of mindfulness-based treatment in gambling disorder [49]. Based on an assessment and review of the mechanisms underlying the improvements facilitated by the use of mindfulness in problem gamblers, Shonin et al. have argued that mindfulness approaches are likely to have psychotherapeutic utility across a wider variety of behavioural addictions (e.g. sex addiction, internet addiction, social networking addiction and video game addiction) [51]. That said, further empirical and clinical research utilizing larger-sample controlled study designs is clearly needed.

Pharmacotherapy

Pharmacological approaches to the treatment of substance use disorders have utilized either substitution-based methods (i.e. nicotine replacement or opioid maintenance) or have targeted monoaminergic or endogenous opioidergic neurotransmitter systems [52, 53]. Currently, there are no licenced medications for behavioural addiction. However, a recent meta-analysis by Bartley et al. [54] of the efficacy of pharmacotherapy in gambling disorder found that that opiate antagonists were the only group of medications statistically superior to placebo, showing a reduction in gambling urges and longer periods of abstinence. There are relatively few randomized controlled trials of pharmacotherapy for other putative behavioural addictions, and it is perhaps premature therefore to draw strong conclusions about the extent of overlap with work on pharmacotherapy of substance use disorders.

Conclusions

In this paper, we reviewed data contributing to the debate on the diagnostic validity and clinical utility of the concept of 'behavioural addiction'. Chemical addiction has been conceptualized as a chronic neurobiological disease that is linked to alterations in reward and control systems [27], and that results in compulsive behaviours which are continued despite significant negative bio-psychosocial consequences and adverse effects [55]. There is, however, little consensus on the necessary and sufficient criteria that are relevant to such a model and that would allow extension of the construct to include behavioural addiction [56]. Moreover, criticisms of the construct of behavioural addiction include the current lack of empirical evidence for negative consequences of certain reward-seeking behaviours and doubts over the applicability of tolerance and withdrawal to such behaviours [57, 58]. Indeed, while research on behavioural addictions has indicated that these may share clinical and neurobiological parallels with substance addictions, there are also many dissimilarities [59, 60].

The construct of behavioural addictions has however been productive in research and may also contribute usefully to clinical practice. The construct is arguably a useful *tool-with-which-to-think* about a large group of maladaptive behaviours, which are often otherwise neglected, both in research and in practice. Useful hypotheses regarding behavioural addiction may emerge from the large body of work on pathological gambling, exercising, sexual behaviour, shopping, online chatting, video gaming and eating, and this in turn may aid the better understanding and classification of, and intervention planning for, this set of conditions. One potential advantage of expanding the category of substance use disorders to include behavioural addictions is the possibility that similar assessment and treatment approaches for this range of conditions would lead to improved health outcomes for individual patients.

Nevertheless, further work is needed to assess fully the diagnostic validity and clinical utility of the construct of behavioural addictions. There are very few studies regarding the epidemiology and aetiology of these disorders, and there is concern that the medicalization of behavioural addictions drives our attention to the individual and away from the societal, technological and financial systems that may make individuals susceptible to the development of these conditions [61]. An important consideration is how best to draw thresholds for these disorders so that inappropriate diagnoses are not given for behaviours that are either normative (for example, sex) or simply illegal (for example, stealing). Uniformly agreed-upon diagnostic criteria and valid and reliable assessment instruments targeting specific symptoms, their severity and their impact in multiple domains would facilitate comparisons across studies. Such work may help address the paucity of data on the psychobiology and management of these

conditions, and such data would in turn allow the field to better approach their conceptualization and classification.

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Compliance with Ethical Standards

Conflict of Interest Dr. Stein reports personal fees from Lundbeck, personal fees from Novartis, personal fees from AMBRF, other from NRGF, personal fees from SERVIER, personal fees from BIOCODEX, grants from MRC, personal fees from SUN and personal fees from CIPLA, outside the submitted work.

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